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City and County of San Francisco Telecommunications Plan

Telecommunications Commission

November 2001

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I. Forward

[To consist of letters from Mayor, Commission President and Department Executive Director.]

II. User's Guide

The City and County of San Francisco's Telecommunications Plan addresses both the telecommunications needs of the public as well as the needs of City government. The Plan was created to provide guidance to all City departments regarding telecommunications issues and serve as a framework for consideration of telecommunications initiatives.

This guidance is provided by first establishing overall goals, then proposing initiatives to achieve those goals, and finally recommending suggested legislative policies for implementing these goals. To determine whether the initiatives and each goal is accompanied by measures of success.

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decision-makers to recommend ways that the City change or refine its policies over time. This first edition of the Plan will serve as a springboard for comment as the City revises its telecommunications policy over time and responds to changes in the telecommunications landscape.



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This guidance is provided by first establishing overall goals, then proposing initiatives to achieve those goals, and finally recommending suggested legislative policies for implementing these goals. To determine whether the initiatives and policies achieve the goals, each goal is accompanied by measures of success.

The Plan provides a framework for assessing proposed telecommunications initiatives to determine whether they are consistent with the guidance of the Plan. If inconsistent, the initiative will need to be reconsidered or the inconsistency may suggest that the Plan requires modification.

While the Plan looks to the future of telecommunications in San Francisco, it primarily reflects the current telecommunications landscape. It takes into consideration public input on telecommunications issues, the state of the telecommunications industry, the current regulatory environment, and the market for telecommunications services.

Readers can use this Plan to identify the City's role with respect to telecommunications, and identify the City's telecommunications goals and the strategy for achieving these goals. As new initiatives are introduced, readers can compare these ideas to the Plan to see if they are consistent with the City's overall telecommunications vision, thus advancing the City's goals.

The Plan is not static, but will be evolving and re-issued over time. Consequently, this edition of the Plan can be used as a basis for the public and decision-makers to recommend ways that the City change or refine its policies over time. This first edition of the Plan will serve as a springboard for comment as the City revises its telecommunications policy over time and responds to changes in the telecommunications landscape.

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IV. Executive Summary

The Mayor and Board of Supervisors, through Ordinance 293-96, created a Telecommunications Commission ("Commission") for the City and County of San Francisco ("City") and directed it to prepare a Telecommunications Plan ("Plan") by evaluating City policies and procedures affecting the provision of telecommunications services and the installation of facilities. The Plan that follows was developed based on significant research and public participation, addresses telecommunications needs of the community, businesses, and local government, and meets requirements outlined in the Ordinance, which include:

- Facilitating the deployment of telecommunications facilities in the City;
- Maximizing the availability of telecommunications services to City residents, businesses and Government;
- Preserving City property and resources, and
- Protecting the health, safety and welfare of City residents.

In addition to meeting the requirements of the City's Ordinance, the Plan provides several other benefits including:

- Establishing an overall telecommunications strategy for the City;
- Answering the most important public questions related to internal and external telecommunications policy;
- Serving as a framework for telecommunications related decision making;
- Providing a way to check the progress of telecommunications initiatives; and
- Guiding the development of implementation plans and budgets for telecommunications initiatives.

For purposes of this Plan, the term "telecommunications" focuses on the transmission of information, rather than the creation, management or processing of information, which is the broader realm of information technology. Additionally, while the underlying goals of this Plan are independent of any State or Federal legal restrictions, the goals, initiatives and proposed policies recognize and are influenced by the constraints imposed by State and Federal law. Finally, the Plan distinguishes between "external" - the telecommunications services and infrastructure available to the public and "internal" - the services and infrastructure used by San Francisco's local government.



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The Plan begins with a brief description of the current state of telecommunications in San Francisco by providing a snap shot of existing telecommunications services and underlying infrastructure used to supply these services. Ultimately, as consumers, both the public and City government are interested in services. The underlying network and physical connections become important because of their capability of delivering services. The availability of services depends on the robustness of the underlying infrastructure; low quality networks and physical connections constrain the availability of new services.

The networks available to the public vary greatly depending on location in the City. Research conducted for this Plan reveals two very different telecommunications landscapes: residential neighborhoods versus the downtown commercial district. Residential neighborhoods have access to basic services and a limited range of advanced services, are served by fewer providers, and generally have less robust networks. While the central business district has access to the basic and advanced services they need, and is served by multiple providers with more robust networks.

The principal *external issues* revealed by our research include:

- The deployment of robust new or upgraded networks in residential networks is only beginning, covering a limited geographic area;
- Choice of service providers is limited in residential neighborhoods;
- Providers are having difficulty quickly and efficiently fulfilling orders for new services, particularly high speed Internet access;
- Customer service, especially with respect to billing, is often poor;
- It is sometimes difficult for small businesses to compare services and prices;
- There are regions within the City where certain services, such as payphones and mobile phones, are not readily available; and
- Installation of telecommunications facilities is causing disruption of mobility and visual blight.

To address these issues and promote community and economic development, the Plan recommends the following goals.

- Consumers—individuals, businesses and community-based organizations (CBO's) -- have a choice of advanced, affordable telecommunications services to promote individual, community and economic development.

- Consumers receive sufficient information to make choices about telecommunications services and receive high quality, responsive customer service.
- The public benefits from state of the art emergency communications services, i.e., E911, by being able to reach these services easily via a wide variety of sources.
- Residents, businesses and other government entities are able to use technologies, including the Internet, to access City services, transactions, and information and participate in democratic processes.
- Installation of telecommunications facilities occurs with the least possible harm to neighborhood aesthetics, public safety, and traffic flow.

While the City offers three telecommunications related services to the public: emergency communications services, electronic government services, and public access points, it is also a large user of telecommunications goods and services. Even more than most large, complex service enterprises, City government requires highly reliable communications systems to receive public health and safety requests. It needs highly reliable, high capacity, physical data connections to distribute this information. These requirements are in addition to the systems necessary to address more everyday public needs and to administer a large enterprise.

The City differs from other large institutions in that its facilities span the entire City and are not confined to the commercial core. Consequently, City government cannot take advantage of the competitive offering available exclusively in the downtown area or to large institutions in a concentrated area. One theme emerges from the review of the City's telecommunications – the City has taken a department-oriented focus for these services. Voice and especially data services have been delivered to address immediate departmental needs and do not reflect a planned, coordinated effort to efficiently meet overall City government-wide needs.

The principal *internal issues* concerning the City revealed by the examination of its current telecommunications arrangements are:

- A lack of coordination and planning has led to inefficient use of telecommunications resources; and
- Additional capacity will be necessary to meet increased demand due to the expansion of existing service/applications and the introduction of new ones.

To address these internal City government issues, the Plan recommends attaining the following goals:

ize management of telecommunications resources and services;

ish a converged enterprise network to support the City's internal
ons;

3 of telecommunications assets obtained through negotiated
ents; and

3 an efficient sourcing strategy for obtaining telecommunications
s and services.

re the necessary outcomes that allow San Francisco to realize the
communications resources and services, and allow the City to
benefits of expenditures related to meeting internal
ations needs. Specific initiatives, policy recommendations, and
3 support each goal. The initiatives represent best practice
irms of specific programs and actions that support achievement of
3 policy recommendations support implementation of the initiatives.
will determine if the initiatives are effective in achieving the goal.

as by looking to the future of telecommunications in San Francisco,
1 by "the network" and includes continued growth in demand for
cess, difficulty in deploying high-speed infrastructure, network
transformation and convergence of end-user devices, and
intent and applications. Since networking will continue to be
the foreseeable future, San Francisco must enjoy the benefits of a
mmunity and remain a viable place for information-dependent

ernet access will continue to grow. Availability, cost, and
of popular applications that use high-capacity bandwidth will
ultimate demand for broadband Internet access. In the immediate
vices such as interactive TV, video on demand, and wireless data
as long as bandwidth is available to support them. In the longer
nunications service will be embedded in other household items,
nces, so that the distinction will be blurred.

uestion of whether the underlying physical network will be in place.
the industry was enthusiastically deploying new facilities and
sting networks. Even with a slowdown in deployment, or perhaps
the industry will continue to find ways to pump more information
ig facilities, like the predominantly twisted copper telephone plant,
ntly coaxial cable plant, the airwaves or possibly electrical wires.
will be whether individual consumers demand for new high
vices can be satisfied with upgraded versions of these legacy
ll require wholly new fiber to the home networks need to be
decision will ultimately be determined by simple economics.

V. Introduction and Background

This section explains the principle factors that shaped development of a Telecommunications Plan. A City ordinance initially envisioned a strategic plan to address new issues created by an emerging competitive telecommunications market. Beyond Mayor and Board of Supervisors' directives, the nature of telecommunications and complex regulatory landscape it inhabits together shaped development of the Plan. The Telecommunications Commission propelled the Plan from its initial workshops, through oversight of data collection and analysis, to intensive final working sessions to develop the goals, initiatives and policy recommendations that comprise the heart of the Plan.

The Mayor and Board of Supervisors directed the Telecommunications Commission to prepare a telecommunications plan as one of its central duties in Ordinance 293-96. Specifically, the Ordinance directs the Commission to "evaluate City policies and procedures affecting the provision of telecommunications services and the installation of telecommunications facilities within the City and develop a City Telecommunications Plan." According to the Ordinance, the Plan should:

- Facilitate the deployment of telecommunications facilities in the City;
- Maximize the availability of telecommunications services to City residents, businesses and Government;
- Preserve City property and resources, and
- Protect the health, safety and welfare of City residents.

The ordinance further directs the Telecommunications Commission to develop the Plan with maximum public participation, including residents, independent experts, telecommunications providers and City departments.¹

In creating the Telecommunications Commission and charging it with producing a Plan, City decision makers recognized that telecommunications was changing rapidly in ways that would affect the public and the operation of City government. In 1995 the California Public Utilities Commission and shortly thereafter the United States Congress began imposing the regulatory framework necessary for competition.² New providers were seeking to deploy new networks and existing providers were seeking to upgrade their networks, both requiring more intensive

¹ Administrative Code, Section 11.88.

² The State and Federal documents that initially opened markets were: California Public Utilities Commission (CPUC), Decision 95-07-054, July 24, 1995. (Mimeo.) and the 1996 Telecommunications Act.

use of the public right of way. New services, such as the Internet and wireless were becoming more common. Consumers were faced with new and complex choices. Advances in technology and declines in costs, especially with respect to data communications, were making a whole new realm of choices available, especially to large institutions. Together, these changes compelled a close look at City policies toward telecommunications and a comprehensive plan for dealing with this momentous change.

A. Scope of the Plan

The scope of this Plan is determined by our definition of telecommunications and the complex regulatory world it inhabits. The term "telecommunications," as used in this Plan, focuses on the transmission of information, rather than the creation, management or processing of information, which is the broader realm of information technology. This fact is an important consideration when determining the scope of this Plan, because it is tempting to explore these other aspects of information technology.

On the other hand, the regulatory scheme that governs telecommunications is highly complex. Fortunately, one aspect of the complex regulatory scheme that governs telecommunications is relevant to the scope of the plan: What does the City have the authority to do? The precise jurisdictional boundaries of cities are the subject of ongoing court action and regulatory process, the purpose of this discussion is to provide a broad-brushed discussion based on existing statutory language.

1. Telecommunications vs. Information Technology

Telecommunications is the transmission of information, which may include voice, data or video. In this sense, telecommunications is a subset of information technology, which refers to the creation, managing and processing of information generally.³ Telecommunications is altogether distinct from publishing multimedia content or applications for the Internet or other distribution mechanisms, another element of information technology. Telecommunications represents critical infrastructure in an information age.

This distinction between telecommunications and information technology is consistent with the definition of telecommunications set forth in the City's Administrative Code that defines telecommunications as:

³ IT (information technology) is a term that encompasses all forms of technology used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived). http://search390.techtarget.com/sDefinition/0,,sid10_gci214023,00.html

the one or two-way transmission of messages, information, and or programming by electronic means, including the provision of facilities for the generation, transmission, switching, control and/or reception of messages, information and/or programming; provided however that "telecommunications" shall not mean broadcasting ...⁴

This definition of telecommunications is based on transmission of information by electronic means and is clearly distinct from other aspects of information technology.

2. Jurisdiction

The City's authority over telecommunications issues with respect to services offered to the public by providers operating in the City is constrained by State and Federal law. While the underlying goals of this Plan are independent of any State or Federal legal restrictions, the initiatives and proposed policies recognize and are influenced by the constraints imposed by State and Federal law. This section will not neatly package discrete roles for the City, state and federal governments because neat distinctions do not exist. Additionally, we seek to avoid presenting current practice as a fixed boundary on the City's authority and to preserve the City's options for testing these boundaries when doing so would best serve the public interest. Finally, this discussion is based on a reading of state and federal statutes without reference to interpretation by regulators or courts.

The most important constraint on local authority in federal law is the prohibition on imposing barriers to entry. Section 253 of the 1996 Telecommunications Act prohibits local governments from imposing barriers to entry. Barriers to entry are defined as statutes, regulations or legal requirements that would have the effect of prohibiting a telecommunications provider from entering the market. The Telecommunications Act reserves the authority for local communities to manage the public right-of-way and require compensation for the use of the public right-of-way as long as this compensation requirement is applied in a fair, reasonable, competitively neutral and nondiscriminatory manner.

Federal law distinguishes between telecommunications and cable. Telecommunications services are governed by Title II, while cable services are governed by Title IV of the Communications Act. The Act defines telecommunications service by first defining telecommunications as:

⁴ AC Sec. 11.85(gg))

The transmission, between or among points specified by the user, of information of the user's choosing, without changing in the form or content of the information as sent and received.⁵

And then defining telecommunications service as:

The offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used.⁶

The Act defines cable service as:

- (A) the one-way transmission to subscribers of (i) video programming, or (ii) other programming service, and
- (B) subscriber interaction, if any, which is required for the selection or use of such video programming or other programming service.⁷

The Act speaks extensively to the states' role in regulating telecommunications and local jurisdictions' authority to grant franchises.

Title VI of the Act recognizes the power of local franchising authorities, such as the City, to require, manage and enforce cable franchises, but places specific restrictions on what can be done and how to do it. Some of the most important provisions that affect the City's authority are that Franchising authorities:

- May regulate rates only for the most limited basic service tier under a strict FCC formula and may not regulate rates at all where the FCC deems there is effective competition;
- May not impose a franchise fee which exceeds 5% of gross revenue;
- Cannot award exclusive franchises and cannot unreasonably deny an additional competitive franchise;
- May require designation and use of franchise capacity for public, educational and government programming;
- May not prohibit ownership or control of a cable system because of a company's ownership or control of any other media;

⁵ 47 USC 153(43)

⁶ 47 USC 153(46)

⁷ 47 USC 522 (CA 602 (6))

- Must follow certain guidelines when granting franchises, and
- May invoke a formal renewal procedure set forth in the Act.⁸

The 1996 Telecommunications Act also created a new class of multichannel video system called an Open Video System (OVS). Telephone companies, also known as local exchange carriers, could apply to become an OVS and then compete with cable companies. The Act reduces the regulatory burden for OVS providers by excluding them from certain cable regulatory requirements, such as rate regulation.⁹ Cities may not require franchises for these carriers, but are permitted to impose certain specified requirements similar to those for cable operators.

Federal law also recognizes and places restrictions on the authority of local governments to make zoning decisions concerning the placement of wireless facilities. Section 331 of the Act affirms the authority of local governments over decisions regarding the placement, construction and modification of wireless facilities, but imposes the following restrictions on this authority. More specifically, local governments:

- Cannot discriminate among providers;
- Shall not prohibit or have the effect of prohibiting the provision of wireless services; and
- Cannot regulate the placement of wireless facilities on the basis of the environmental effects of radio frequency emissions, beyond the application of FCC rules governing these emissions.

State law gives the California Public Utilities Commission (CPUC) authority to grant what amounts to a statewide franchise for telephone companies. Section 7901 of the State Public Utilities Code states that telephone corporations may construct their facilities along roads and highways, also known as the public right-of-way. This effectively precludes local jurisdictions from granting franchises for telephone corporations as they do cable companies and other utilities. The state law clarifies that local jurisdictions can exercise reasonable control over the time, place and manner in which telephone corporations access the public right-of-way.

State law also specifies the conditions under which a local franchising authority can grant an additional cable franchise. Section 53066.3 of the Government Code establishes procedures cities must follow and considerations cities must take into account when granting an additional cable franchises. Among its most

⁸ 47 USC 543, 542, 541, 531, 533(d), 540, 546.

⁹ 47 USC 573

important provisions, Section 53066.3 states that the additional franchisee must serve the same geographical area as the incumbent cable operator.

B. Goals and Benefits of the Plan

The creation of a telecommunications plan achieves a number of goals and a variety of benefits. The principle goals and benefits are that the Plan:

- Provides an overall telecommunications strategy for the City;
- Answers the most important public questions related to internal and external telecommunications policy;
- Serves as a framework for telecommunications related decision making;
- Provides a way to check the progress of telecommunications initiatives; and
- Guides the development of implementation plans and budgets for telecommunications initiatives.

C. Method

The Telecommunications Commission, with DTIS providing administrative and drafting support, developed the plan by holding initial public meetings to identify issues and overseeing data gathering and public workshops to complete key elements of the plan. The data gathering effort reached all elements of the public—including telecommunications providers, residents and businesses. As directed by the Administrative Code, the Telecommunications Commission sought a high level of public input in the form of data gathering and public discussion of telecommunications issues. To conclude the planning process, the Telecommunications Commission also engaged in a series of intensive workshops to forge the critical strategy element of the Plan: the Goals, Initiatives and Policies. (See Appendix A for a more detailed discussion of the method for preparing the Plan.)

The following stages of Plan development illustrate the method used to formulate the Plan.

1. Undertake preliminary assessment of market conditions.
2. Convene preparatory meetings and working groups.
3. Conduct extensive data gathering, captured in the following reports:
 - A Survey of Telecommunications Companies Doing Business in San Francisco (See Appendix B.)
 - Results of the 1999 Survey of Residents on Telecommunications Issues (Appendix C.)

- Report on the Small Business Focus Groups (Appendix D.)
 - Report of Interviews of Major Telecommunications Institutional Users (Appendix E.)
 - Telecommunications Needs Assessment and Implementation Plan (Appendix G).
4. Perform initial assessment of data and formulate outline of strategy.
 5. Complete a series of targeted public participation meetings for the following groups:
 - Telecommunications Providers
 - Local Businesses
 - Economically Challenged and Homeless
 - Youth
 - Seniors and People with Disabilities
 - General. (Minutes from these meetings are included in Appendix F.)
 6. Prepare initial draft of Plan.
 7. Conduct intensive Telecommunications Commission workshops to refine the Plan.
 8. Prepare second draft of Plan based on Telecommunications Commission direction.

The Plan is not complete with publication of a document. Planning is an ongoing process involving two additional, crucial steps:

9. Create implementation plans to make the strategic Plan operational; and
10. Review and update of the Plan.

VI. Goals, Initiatives & Policy Recommendations

The goals, initiatives and policies are the heart of the City's telecommunications Plan. As a result of a comprehensive planning process, these goals, initiatives, and policy recommendations related to telecommunications were developed and organized into two categories:

- Internal Telecommunications Needs; and
- Community and Economic Development Needs.

Internal Needs relate to telecommunications services provided to and used by City departments. Community and Economic Development Needs, or External Needs, address telecommunications infrastructure and services for the public. These two areas overlap since the City provides some telecommunications related services directly to the public, such as emergency communications and electronic government. Internal goals also differ in the extent to which the City can control the outcome. The internal goals are largely within the City's control. By contrast, many of the external goals are largely accomplished by the private sector under oversight by government.

The goals are the necessary outcomes that allow San Francisco to realize the benefits of telecommunications resources and services, and allow the City to maximize the benefits of expenditures related to meeting internal telecommunications needs. The initiatives represent best practice strategies in terms of specific programs and actions that support achievement of the goals. The policy recommendations support implementation of the initiatives. Each goal is accompanied by measures to determine if the initiatives are effective in achieving the goal.

The impact of these goals, initiatives and policy recommendations to the future of telecommunications in San Francisco is discussed in the *A Look Into the Future* section of this Plan.

A. Community and Economic Development Needs

The goals related to community and economic development are designed to serve as the basis for decision making related to how the City ensures that consumers, meaning individuals, businesses and community based organizations, have access to the telecommunications resources they need. Telecommunications infrastructure and services are an essential foundation for economic and community development. As the economy becomes increasingly based on knowledge, the capacity to transmit information becomes increasingly significant for continued growth. In addition to providing this infrastructure for a knowledge-based economy, this goal also entails supporting telecommunications and related information based industries. The following five goals to achieve these outcomes are:

VI. Goals, Initiatives & Policy Recommendations

- Consumers—individuals, businesses and community-based organizations (CBO's) -- have a choice of advanced, affordable telecommunications services to promote individual, community and economic development;
- Consumers receive sufficient information to make choices about telecommunications services and receive high quality, responsive customer service;
- The public benefits from state of the art emergency communications services, i.e., E911, by being able to reach these services easily via a wide variety of sources;
- Residents, businesses, visitors, and other government entities are able to use technologies, including the Internet, to access City services, transactions, and information and participate in democratic processes; and
- Installation of telecommunications facilities occurs with the least possible harm to neighborhood aesthetics, public safety, and mobility.

The City has two roles in achieving these goals. For the goals related to electronic government and emergency services, the City is directly responsible for providing these services. For the goals related to access, consumer information, and installation of facilities, the City has a role in facilitating, monitoring, and regulating the efforts of private telecommunications providers.

The City has a less direct role in the access, consumer information, and facility installation goals because the Plan relies on private telecommunications providers operating in our marketplace doing the "heavy lifting" in terms of deploying facilities. This understanding of how providers will operate in the marketplace is based on empirical evidence gathered in preparing this report, not doctrine or assumption. Since this evidence is from the very early stages of market development, the industry may not evolve entirely as expected. If providers operating in our market do not perform as expected, more direct intervention by the City may be necessary. It should also be noted that federal and state laws support a market-based approach.

As noted in the *San Francisco Today* section of this Plan, recently conditions in the market appear to have shifted. This change reinforces our observation that the market is very young. Consolidation and shakeout result from the experimental nature of competition for the last mile of telecommunications services. The new conditions may more realistically reflect the actual demand for new telecommunications services and the cost of supplying them. In the midst of this restructuring, it is important to keep in mind that even though industry structure may be in flux, knowledge-based industries will continue to be vital to

the City's economic development and the City must continue to support the telecommunications and related information-based industries.

It is important to keep in mind the difference between the investment environment and the market. The investment environment reflects a best estimate of the profitability of deploying new services and, in an industry with rapidly changing technology, a certain amount of speculation about consumer preferences and producer costs. The market conditions represent actual consumer preferences and provider costs as revealed through actual behavior.

1. Community and Economic Development Goal 1: Consumers—individuals, businesses and community-based organizations (CBO's) -- have a choice of advanced, affordable telecommunications services to promote individual, community and economic development.

Community and Economic Development Goal 1 is broad in scope and fundamental to the other external goals. This goal focuses on access and addresses the needs of all consumers, including individuals and entities that need telecommunications services. Access means that telecommunications services are available in all neighborhoods, including central business districts and outlying residential areas, as well as affluent and low income regions. Access seeks to reach all classes of consumers, including residential and small business. The goal also stresses the importance of consumer choice and competition among providers to offer that choice.

Access to telecommunications means more than access to a set of goods and services. It means that the essential infrastructure needed in an information-based economy exists. Consequently, access and choice are necessary to the City's economic and community development. In order to ensure that San Francisco's telecommunications infrastructure meets a growing demand for information, it is necessary to support telecommunications and related industries.

The term advanced services embraces all emerging telecommunications technologies, including high speed data service, but also other emerging services and dimensions of service, such as high speed mobile data services. The goal also recognizes the importance of affordability, i.e. that for availability and choice to have meaning, services have to be offered at prices that will allow consumers to adopt them.

a) Initiatives to Achieve Access and Choice

The City adopts the role of facilitating, monitoring and, when necessary, regulating the actions of private telecommunications providers in the initiatives to achieve access. In this role, the City shapes and directs the market to address public needs when it has identified specific problems. The initiatives take a variety of approaches. Some initiatives facilitate entry by streamlining regulatory processes; others address the needs of vulnerable communities, such as low

income and people with disabilities, while yet others promote economic development by linking business with available infrastructure.

It is important to put these initiatives in perspective. For example, some of the initiatives facilitate entry by streamlining regulatory processes or promoting the participation of minority and women owned business enterprises (MB/WBE). While these initiatives may be necessary to allow entry by telecommunication companies, they do not guarantee successful entry into the market.

Initiatives that support access are listed below.

- A.1.1. Facilitate Entry: The City facilitates efficient competitive entry by (1) continually streamlining the permitting and franchising process; (2) ensuring that fees reflect costs to City and the public; and (3) advocating for fair, competitively neutral compensation for using the public right of way.
- A.1.2. Public Access Points: After soliciting public input and seeking private cooperation, the City provides public access points to advanced telecommunications services at locations such as public libraries, community centers and kiosks.
- A.1.3. Access for People with Disabilities and Limited English Proficiency: The City promotes access by people with disabilities and limited English proficiency through such measures as ensuring that public City telecommunications equipment is accessible, exploring a Second Audio Program (SAP) for video broadcasts, and improving access to public information through captioning of video.
- A.1.4. Graphical Inventory of Commercial Fiber Optics: The City's enterprise IT department creates, maintains and makes publicly available a graphical inventory of commercial fiber optic resources to aid in attracting businesses.
- A.1.5. State and Federal Advocacy: The City advocates for state and national policies that promote expeditious, non-discriminatory deployment in urban areas, allow fair and vigorous competition, and include an appropriate role for local government. The City seeks to coordinate its advocacy with private groups, such as consumer advocates.
- A.1.6. Support for Low Income Consumers: The City supports efforts to ensure that rates are affordable especially for low-income consumers.
- A.1.7. Open Access: The City continues to advocate for requirements for network owners to provide open, non-discriminatory access

to their facilities to non-affiliated service providers at equitable rates and terms.

- A.1.8. Minority and Women Owned Businesses: The City ensures that Minority Business Enterprises and Woman Business Enterprises (MB/WBE) have full and equitable opportunities to participate in the City's telecommunications contracts and franchises and seeks to increase the pool of available MB/WBE's for telecommunications.
- A.1.9. Franchise Enforcement: For the operators the City regulates, the City's enterprise IT department monitors and enforces franchise requirements including the requirement to deploy in all San Francisco neighborhoods and provide low income discounts.

b) Policy Recommendations to Achieve Access and Choice

Achieving this goal will require the City to continue existing policies and implement new programs at the department level including:

- The City continually reviews permitting and franchising processes to ensure that they are as efficient as possible;
- The City's enterprise IT and Contracts departments take a proactive approach in recruiting new MB/WBE's for telecommunications; and
- The City's enterprise IT department creates an inventory of public access points, seeks public input to identify unmet needs and consults with private groups to find resources for meeting those needs.

c) Measures of Access and Choice

To assess achievement of this goal, the City will measure the number of consumers that have advanced services available to them; the number of consumers that have a choice of advanced service providers, and the prices for these advanced services. Where appropriate, these measures will be compared to a benchmark of other similarly situated cities.

- Availability: Percentage of households, businesses and CBOs with advanced services available, especially in low-income neighborhoods and neighborhood commercial districts.
- Choice: Percentage of households, businesses and CBOs with a choice of advanced services providers at the facility and retail levels.
- Affordability: Price of advanced services, including price after available low-income discount applied.

- Industry Vitality: Net change in employment, payroll, and number of firms in telecommunications and related industries.

2. Community and Economic Development Goal 2: Consumers receive sufficient information to make choices about telecommunications services and receive high quality, responsive customer service.

This goal has two components. First, in order for consumers to benefit from choice, they must have knowledge about service and prices. Second, in order for customers to profit from services, they must receive responsive customer service from providers.

a) Consumer Knowledge and Customer Service Initiatives

The initiatives to support consumer knowledge and customer service address niche areas where the City may effectively intervene and promote advocacy for stronger state and federal regulation. Some of the initiatives target information to select groups, such as small businesses and enforcing customer service provisions of cable franchises. Other initiatives involve the City advocating for appropriate consumer safeguards on a broader basis.

- A.2.1. Targeted Information for Selected Groups: Appropriate City agencies coordinate with local business and neighborhood associations, consumer advocates, and the telecommunications industry to provide targeted information to groups of consumers. For example, the Small Business Commission may provide workshops on telecommunications services to small businesses.
- A.2.2. Consumer Information and Protection Advocacy: The City advocates for requirements at the state and federal level for all providers to supply clear and accurate information on prices and strong customer service standards, monitoring, and enforcement. The City should seek to coordinate these efforts with those of independent consumer advocates.
- A.2.3. Consumer Information and Protection Information: The City implements and enforces customer service standards for carriers it regulates.
- A.2.4. Consumer Knowledge Dissemination: The City's enterprise IT department and other appropriate departments accurately direct consumers to available information on prices, services, and service quality.
- A.2.5. Consumer Knowledge and Protection Advocacy for People with Disabilities and Limited English Proficiency: The City advocates for easy access to consumer information by people with disabilities and limited English proficiency.

b) Consumer Knowledge and Customer Service Policy Recommendations

In order to implement these initiatives, the City should put into action the following policies.

- The City advocates for stronger consumer information and customer service standards in collaboration with consumer groups that share similar public interest goals.
- The City works with consumer advocates and the industry to assess available consumer information and identifies accurate and reliable sources of information.

c) Consumer Knowledge and Customer Service Measures

The consumer knowledge and customer service measures assess end results: whether San Francisco consumers are satisfied with the information and customer service they receive from providers.

- Customer Service: consumers are satisfied with customer service they receive from providers.
- Information: consumers are satisfied with available information about providers' services, terms, and charges.
- Availability of Information: customers have information available in a variety of languages and delivery methods.

3. Community and Economic Development Goal 3: The public benefits from state of the art emergency communications services, i.e., E911, by being able to reach these services easily via a wide variety of sources.

This goal means that all residents and visitors can reach emergency services. It has two components: (1) a robust, reliable emergency communications system, and (2) ready access to services. The second component means that users can access the emergency communications system from anywhere in the City in an emergency situation by a variety of means, such as the wired telephone, wireless telephones, payphones, and, where necessary, special call boxes.

a) Emergency Communications Initiatives

The City's emergency communications initiatives consist of ensuring that systems are reliable and developing a program to ensure access from all areas in the City.

VI. Goals, Initiatives & Policy Recommendations

- A.3.1. Reliable Emergency Communications Systems: The City ensures that emergency communications systems are highly robust and reliable.
- A.3.2. Ubiquitous Access to Emergency Communications: The City develops and implements a program for identifying and filling possible gaps in availability of access to emergency communications service, including ensuring and/or deploying pay phones, solar operated emergency phones in remote areas, and ubiquitous wireless coverage.

b) Emergency Communications Policies

The principal emergency communications function, the implementation and operation of the CECC is an ongoing policy, to supplement it:

- The City should work with the public and the telecommunications industry to develop a mechanism to systematically identify, inventory, locate and deploy resources to fill possible gaps in service.

c) Emergency Communications Measures

The measures of the emergency communications systems examine the availability and coverage of the system as a whole.

- Availability: *Ratio of time the public safety communication systems are working properly to the total time the systems should be available.*
- Coverage: *Percentage of areas where service can be obtained by various means.*

4. Community and Economic Development Goal 4: The City adds the ability to deliver government services electronically so that residents, businesses, visitors, and other government entities are able to use technologies, including the Internet, to access City services, transactions, and information and participate in democratic processes.

Providing residents, businesses, visitors and other government entities with the ability to access City services, transactions, and information and participate in the democratic process electronically advances community and economic development by making transactions with the City less costly and time consuming for users. While the focus is on Internet based services; electronic government embraces all technologies that enhance public access to government services including the government cable TV channel, interactive telephone systems, and kiosks. This goal does not seek to supplant traditional methods of obtaining these services, only provide users with other avenues that are more convenient for some. The goal has the additional benefit of causing the

City to re-examine and, if necessary, re-design its internal processes to improve efficiency.

a) Electronic Government Initiatives

The initiatives to support electronic government aim to implement these new processes in an efficient and user friendly manner. To be successful, this effort will demand constant attention to the needs of customers as well as thorough knowledge of the best services available in the private sector. In addition, the effort will require the enterprise IT department to market electronic government to other City departments so they recognize its benefits, and to implement in an efficient and secure manner.

- A.4.1. Marketing Electronic Government to Departments: The City's enterprise IT department actively markets best practice electronic government applications and services, including automation of the underlying business functions, to City departments.
- A.4.2. Marketing Electronic Government to the Public: The City's enterprise IT department and other departments market and train the public on the effective use of automated systems and methods of access to local government.
- A.4.3. Electronic Government Infrastructure and Resources: The City's enterprise IT department develops robust infrastructure and adequate resources to support e-government services.
- A.4.4. Electronic Government Quality: The City's enterprise IT department ensures that Internet based services and transactions are as accurate, private, and secure as possible.
- A.4.5. Access to Electronic Government by People with Disabilities and Limited English Proficiency: The City's enterprise IT department seeks to make information and services accessible to people with limited English proficiency and people with disabilities, using technologies such as translation software and captioning.

b) Electronic Government Policy Recommendations

In order to implement the Electronic Government Initiatives, the City must adopt the following policies.

- The City's enterprise IT department will create a unit dedicated to researching, marketing, and implementing electronic government services within the City and among the public.

- City departments will consider electronic delivery of services wherever possible and work with the enterprise IT department to improve business processes and use technology to improve and expand service delivery.

c) Electronic Government Measures

To measure the success in achieving the electronic government goal, the City should first assess how many government services amenable to electronic delivery are actually available electronically and then assess how the public accepts these new services in terms of ease of use and satisfaction.

- Availability: the amount of information and the number of transactional systems and participatory applications that are available to the public through advanced technologies.
- Ease of Use: the number of service requests and transactions started and subsequently completed.
- Customer Satisfaction: customer feedback on appropriateness and quality of information and service offerings.

5. Community and Economic Development Goal 5: Installation of telecommunications facilities occurs with the least possible harm to neighborhood aesthetics, public safety, and mobility.

This goal ensures that telecommunications facilities are fully integrated into the design of the City. This approach means that telecommunications facilities comply with the same aesthetic and safety guidelines as other structures. It also means that City planning processes recognize the benefits of telecommunications as a way to facilitate a wide variety of activities. The benefits of this two way integration is to ensure that telecommunications facilities are attractive and safe and that the City considers telecommunications as it designs its future.

a) Attractive and Safe Facility Installation Initiatives

The bulk of the initiatives to support the attractive and safe installation of facilities are designed to ensure that facilities are placed in an unobtrusive and safe manner. These initiatives seek to ensure that general principles designed to ensure attractive and safe facilities are applied to telecommunications and do not contemplate any special treatment of telecommunications facilities. These initiatives include ensuring that the City's planning processes take into account telecommunications.

- A.5.1. Street Furniture: The City adopts and the Department of Public Works enforces a "street furniture" policy to ensure that telecommunications facilities are placed in an unobtrusive and

unobstructive manner, consistent with the rapid deployment of advanced telecommunications infrastructure.

- A.5.2. General Plan Integration: The City's Planning Commission integrates access to and the use of telecommunications services into its General Plan by ensuring that revisions to the General Plan take into account the ways in which telecommunications affect communities.
- A.5.3. General Plan Consistency: The City's planning department ensures that telecommunications facilities installed on private property and in the public-right-of-way are consistent with the City's General Plan.
- A.5.4. Building Code Compliance: The City's Department of Building Inspection ensures that telecommunications facilities are safe by confirming that they are installed according to Building Code standards.
- A.5.5. Street Excavations: The City, especially the Department of Public Works, continues to require coordination among providers of placement of facilities in the public right of way.
- A.5.6. Preservation of Planning Authority: The City advocates for the preservation and enhancement of its planning authority.
- A.5.7. Fair Compensation: The City seeks fair compensation for use of the public rights of way by telecommunications carriers, including the direct cost of administering access to the right-of-way; the cost of damage to public property, such as street degradation; the cost of negative externalities, such as traffic disruption, and the fair market value of its property.

b) Policy Recommendations to Achieve Attractive and Safe Facility Installation

This goal will be achieved primarily by applying existing policies, however two new policies are required to accomplish the goal.

- The City adopts an ordinance establishing a "street furniture" policy that governs the placement of facilities, including telecommunications facilities, on sidewalks and utility poles.
- The City's Planning Department and Commission take into account telecommunications when updating the General Plan.

c) Measures of Attractive and Safe Facility Installation

The measures of the attractive and safe facility installation goal seek to verify that certain critical policies are adopted.

- Street Furniture Policy Adoption: The City adopts a policy governing the placement of facilities, including telecommunications infrastructure, in the public right of way after consulting with the public, including residents, businesses and the telecommunications industry.
- General Plan Consideration: The City's general plan reflects the consideration of how telecommunications affect communities.

B. Internal Telecommunications Needs

The goals related to internal telecommunications needs were developed to serve as the basis for decision making related to how the City obtains, manages, and utilizes telecommunications products and services necessary for the provision of government services. The desired outcome is that the City has the telecommunications tools, i.e. infrastructure and services, needed to serve its customers - the individuals and organizations who interact with San Francisco's local government. The following four goals support achievement of this outcome:

- Centralized management of telecommunications resources and services;
- Establishment of a converged enterprise network to support the City's internal operations;
- Enterprise management of telecommunications assets obtained through negotiated agreements; and
- Development of an efficient sourcing strategy for obtaining telecommunications products and services.

1. Internal Goal #1: The City's telecommunications infrastructure and services are centrally managed by an enterprise IT department for maximum efficiency and effectiveness.

An enterprise IT department can most effectively deliver telecommunications infrastructure and services to City departments. By creating a central overseer and caretaker for the City's telecommunications infrastructure and services, the City ensures that resources are shared, network components integrate and operate properly with one another, and that systems are easier to support and maintain.

Achievement of this goal is critical for deployment of enterprise applications such as organization-wide electronic messaging, workflow and electronic document management, customer relationship management, and enterprise resource planning. Without centralized management, individual departments seeking to address their needs may not be aware or take advantage of opportunities to

share resources and ensure that technologies function well within the City's telecommunications environment.

This goal is the foundation for achieving the remaining internal goals related to establishment of an enterprise network, effective management of telecommunications assets, development of a sourcing strategy, and allow enterprise wide negotiations with vendors for better prices.

For centralized management to achieve efficient and effective delivery of telecommunications services, the enterprise IT department should be intimately aware of and responsive to each customer department's needs. A centralized approach must be closely attuned to each client department's needs so that service requirements are not sacrificed in support of an abstract plan.

a) Initiatives to Achieve Centralized Management

Four initiatives have been identified to achieve Internal Goal #1.

- B.2.1. Centralized Management: To enhance the telecommunications services available to departments, the City centralizes telecommunications management, operations and maintenance under an enterprise IT department which exercises end-to-end control over the City's networks and uses best practices for client relationship management.
- B.2.2. Asset Usage: The enterprise IT department manages all of the City's telecommunications assets, including conduit, fiber, and equipment, and coordinates any efforts by a City department or agency to provide, or partner to provide, telecommunications infrastructure or services.
- B.2.3. Network Architecture: The City's enterprise IT department architects, implements, and maintains a flexible network infrastructure based on scalable, sustainable technology and open standards.
- B.2.4. Technical Resources: The City's enterprise IT department secures technical resources to architect, implement, and manage the City's enterprise network.

Each of these four initiatives complements one another to advance the goal of efficient and effective telecommunications management.

b) Policy Recommendations to Achieve Centralized Management

Achieving this goal requires high-level policy changes. Specifically, it requires legislation that establishes an enterprise IT department and clearly articulates the

new department's role and responsibilities. The required legislation has two specific components:

- The City adopts legislation establishing an enterprise IT department to manage the City's telecommunications network, as well as other IT functions; and
- The City adopts legislation authorizing the enterprise IT department to manage all City telecommunications assets for the benefit of the City.

c) Measures of Centralized Management

Three measures can be used to determine whether the City has succeeded in achieving the goal of centralized management of telecommunications infrastructure and services.

- Legislation: The City adopts legislation empowering an enterprise IT department.
- Centralization: An enterprise IT department is created that exercises end-to-end control over the City's network.
- Internal Customer Service: The customers (departments) of the enterprise IT department receive timely, quality services and provide favorable customer service ratings.

2. Internal Goal #2: The City uses a robust, reliable and scalable converged voice, video and data enterprise network to support its telecommunications needs.

The essential features of the enterprise network goal are (1) robust, reliable and scalable performance, (2) voice, video and data convergence, and (3) enterprise scope. While this goal is not based on any specific technology, it represents the most efficient use of available technology to attain the desired features and meet the City's telecommunications needs. The enterprise network goal embraces new technological advances as they become appropriate for adoption by the City.

a) Initiatives to Support a Converged Enterprise Network

Three initiatives have been identified to support achievement of this goal.

- B.2.1. Converged Enterprise Network: The City's enterprise IT department architects and manages a converged voice, video and data network for the entire organization.

- B.2.2. Research and Adoption: The City's enterprise IT department researches new technologies such as wireless services for adoption by the City.
- B.2.3. Emergency Communications: The City ensures that emergency communications systems are highly robust and reliable.

These initiatives support a single objective - to implement and manage a highly reliable, robust and scalable converged network for use by the entire organization. The first step in the process, assessing the current voice and data environment and suggesting a general architecture based on current technologies, has been completed and documented in RCC's Telecommunications Implementation Plan. Now the City's enterprise IT department can architect, deliver, and manage a reliable, robust, scalable converged network that meets the City's telecommunications needs.

The research initiative complements the converged enterprise network initiative by ensuring that the City incorporates the best, most appropriate technology. This initiative does not necessarily mean the latest, most innovative technology, but technologies most likely to support a reliable, robust environment.

While the emergency communications initiative is a sub-set of the converged enterprise network initiative, it is such an important part of the telecommunications network that it is identified separately.

b) Policy Recommendations to Support a Converged Enterprise Network

The most critical policy required to achieve this goal is for the City to adopt the centralized management legislation discussed in Internal Goal #1 above. In addition, the following policy level developments will support this goal.

- The Enterprise IT department must develop a technical architecture and tactical plans for implementing a converged enterprise network, including time lines, deliverables, and budgets.
- The City must adopt budgets that support implementation, management and ongoing maintenance and upgrades of a converged enterprise network.

c) Measures for a Converged Enterprise Network

The measures associated with the converged enterprise network goal are all industry standard network metrics concerning capacity, availability, efficiency and coverage.

- Capacity: Sufficient bandwidth exists on the converged network to implement new voice, data and video applications.

- Availability: The ratio of time the network is working properly (uptime) to the total of the time the network should be available meets all departments' service delivery requirements.
- Efficiency: The network is capable of accommodating existing and emerging voice, video and data applications in a cost-effective manner.
- Coverage: The percentage of City facilities, employees, or network traffic served by converged voice, video and data network meets the City's service delivery requirements and supports implementation of enterprise applications.

3. Internal Goal #3: The City actively pursues and maximizes the benefits of telecommunications assets obtained through negotiated agreements, such as Public, Education and Government access cable channel resources, programming, and telecommunications infrastructure and services.

The purpose of this goal is to ensure that the City maximizes the benefits of assets it obtains through negotiated agreements, such as franchises. These assets vary widely from cable channels for Public, Education and Government (PEG) programming, to underground conduit in which the City can place fiber optic and copper cable, to dark fiber that the City can use to connect City facilities. While many of these assets are obtained as part of cable franchise negotiations, they can also be obtained indirectly through agreements with utilities and telecommunications carriers. For example, the City has obtained access to PG&E conduit as part of a settlement agreement.

The City has accumulated an array of telecommunications assets through negotiated agreements and will have ongoing opportunities to augment these assets. The challenge is to manage these assets effectively so they can be put to the highest valued use based on organization-wide priorities. In the case of telecommunications facilities such as conduit, this approach means putting them to work as part of an enterprise network. In the case of assets that represent outlets for public communication, such as the Public, Education and Government Channels and the City's website, this approach entails ensuring that programming and content are presented in a way that provides a quality viewing experience and access by a wide audience, including those with limited English language proficiency or disabilities.

a) Initiatives to Maximize the Benefits of Telecommunications Assets

These initiatives achieve the goal of maximizing the benefits of telecommunications assets by creating a new emphasis on actively pursuing and managing them at an enterprise level. While the City has obtained and used telecommunications assets in the past, it has traditionally been on a department-

by-department basis. Utilizing these assets in a coordinated, enterprise manner increases their value.

Although the negotiated assets vary widely in nature and how they should be used and managed, they are an integral part of the City's service delivery methodology. Telecommunications assets are best used to support the enterprise network and should be managed by the enterprise IT department. By contrast, the PEG channel assets support provision of services directly to the public.

- B.3.1. Telecommunications Assets: The City's enterprise IT department develops and implements a plan for using negotiated telecommunications assets to meet the City's overall telecommunications needs.
- B.3.2. PEG Channel Assets: The City adopts rules and procedures for the use and operation of PEG outlets, including the appropriate allocation of new PEG resources, such as additional PEG channels.
- B.3.3. Distribution Channels: Each operator of a City sponsored information distribution channel, such as the City's web site or PEG Channels:
 - Develops and implements appropriate presentation standards, such as smooth transition between programs;
 - Develops and implements a plan for expanding access to people with disabilities and people with limited English proficiency; and
 - Increases the use of emerging technologies to distribute content, such as Web streaming.

b) Policy Recommendations to Maximize the Benefits of Telecommunications Assets

To implement the initiatives to maximize the use of telecommunications assets will require legislative action.

- The legislation establishing an enterprise IT department discussed above gives the new department authority to manage the use of negotiated telecommunications assets.
- The City adopts rules and procedures for the use and operation of PEG channels.

c) Measures of Maximizing the Benefits of Telecommunications Assets

This goal can be measured in terms of the quantity of negotiated assets obtained and the degree to which they are used:

- Availability: The amount of telecommunications assets obtained through negotiated agreements.
- Usage: The percentage of capacity being utilized or for which utilization is planned.

4. Internal Goal #4: The City employs a “sourcing strategy” to obtain the best possible telecommunications equipment, software, and services that considers all options, including 1) outsourcing/purchasing, 2) in-sourcing, and 3) partnering, when making business decisions.

This goal addresses the way in which the City obtains telecommunications equipment, software, and services. The purpose of the goal is to ensure that the City obtains these resources in the most efficient way possible. Efficiency encompasses more than cost. It also includes timeliness and quality. To accomplish this goal, the City must consider all options including: outsourcing/purchasing – obtaining the product or service from an outside source, i.e. vendor, contractor or service provider; insourcing - providing the product or service with internal staffing resources, or partnering - working cooperatively with an outside organization to provide the product or service.

a) Initiatives that Support a Sourcing Strategy

These initiatives are designed to establish a process for thoroughly evaluating possible sources and selecting the source that will provide the City with the best equipment, software, and services in the most efficient manner.

- B.4.1. Sourcing Strategy Process: The City's enterprise IT department develops and implements a rigorous process and metrics for evaluating the best source for provision of telecommunications products and services.
- B.4.2. Sourcing Strategy Evaluation: The City's enterprise IT department takes into account factors such as cost, expertise, viability of the provider, track record, customer satisfaction and experience, when evaluating sourcing options.

b) Policy Recommendations that Support a Sourcing Strategy

To support implementation of an efficient sourcing strategy, the enterprise IT department must establish a rigorous process and metrics for evaluating the best

source for telecommunications products and services that takes into account all relevant factors.

c) Measures of an Efficient Sourcing Strategy

This goal is aimed toward creating a reliable process for choosing the most appropriate source to meet the City's telecommunications needs. Consequently, three measures assess whether the goal has been achieved.

- Accuracy: How close the actual outcome of the sourcing decision is to the anticipated outcome, based on the metrics used to select the source, such as cost benefit or return on investment analysis.
- Quality: The level of customer satisfaction with the product or service.
- Longevity: Does the product or service remain compatible with enterprise-wide systems as they evolve in the long run.

The accuracy measure determines whether the process is reliable and whether a bias exists toward one sourcing alternative over the others. The customer satisfaction measure determines if the sourcing strategy is achieving the ultimate objective of all the internal goals – departments' satisfaction with telecommunications products and services.

VII. San Francisco Today

This section describes the current status of telecommunications in San Francisco by providing a snap shot of existing telecommunications services and underlying infrastructure used to supply these services. The information is presented in two parts: "external" - the telecommunications services and infrastructure available to the public and "internal" - the services and infrastructure used by San Francisco's local government.

Within the description of services available to the public, it is useful to distinguish between services and competitive options available in residential neighborhoods to small businesses and residential consumers, and services and competitive options available in the downtown area to larger institutions.

This section also considers competition and describes today's regulatory framework. A discussion of telecommunications related services offered by the City is included. It concludes by identifying the principal issues that emerged in a study of San Francisco's telecommunications situation.

A. Existing Telecommunications Resources: Services, Networks and Physical Connections

Telecommunications services, networks and physical connections represent the telecommunications resources that are available to the public and City government. For the purposes of understanding the telecommunications resources available in San Francisco today, we distinguish between these terms as follows.

- "Services" refer to the products employed by the end-user, such as voice communication, video programming and Internet access.
- "Network" refers to the switching or routing system that transmits information.
- The "physical connection" is the media over which a network transmits information, such as coaxial cable, copper wire, and fiber optic equipment or the airwaves in the case of wireless communications.

Ultimately, as consumers, both the public and City government are interested in services. The underlying network and physical connections become important because of their capability of delivering services. The availability of services depends on the robustness of the underlying infrastructure; low quality networks and physical connections constrain the availability of new services. In discussing the telecommunications resources available to the public and City government, this plan reviews services first and then discusses the underlying networks and physical connections that support these services.

The installation of new physical connections is one aspect of telecommunications with significance to all citizens, independent of their capacity as consumers since installation causes disruption and aesthetic concerns that affect users and non-users alike.

This section also presents the services provided by the City directly to the public, such as, information and transactions available electronically, a.k.a. electronic government, emergency communications, and efforts to provide access to communications directly.

1. Competition in Telecommunications

One of the City's existing telecommunications policies is to promote consumer choice through competition.¹⁰ The state of consumer choice and competition emerges as services and networks are discussed. However, in order to provide a better understanding of how consumer choice is evolving, this plan considers opportunities for innovation and competition created by convergence of networks and the legislated competitive scheme.

a) Convergence

Historically, telecommunications networks have been designed for and dedicated to a specific or single service. For example, Pacific Bell's telephone network was designed to carry voice conversations and AT&T's cable network was designed to carry one-way video programming. Today networks are being transformed through convergence, the creation of multi-purpose networks that can carry any type of information, voice, video or data. New networks are being designed with this capability. In addition to opening new markets for providers and permitting new services for consumers, convergence also creates new opportunities for the creation of services by parties that do not own networks.

There are two levels of convergence. The first level of convergence means that voice, video and data traffic are carried over the same set of physical connections and that two or three networks use the same physical connection. The second level of convergence means that voice, video and data traffic shares the same switching or routing network.

For example, cable operators that offer voice, video and data through systems that have been upgraded achieve the first level of convergence by running three separate networks over high quality cable facilities that offer: (1) switched telephone service, (2) video programming and (3) Internet access. This approach is accomplished by splitting frequencies. For example, in the telephone network frequencies are split so that voice traffic is carried in low frequencies and data in high frequencies.

¹⁰ Administrative Code, Section 11.84.

The second level of convergence means that all traffic is digitized and travels over a common protocol. For example, the Internet Protocol (IP) might be used to carry not only data, but also voice (VoIP) and video. This reliance on a protocol allows new opportunities for innovation and competition at the service level. Third party providers can create new services to meet known standards that will operate on established underlying networks.

b) The Legislated Competitive Framework

Telecommunications Act of 1996 contemplated three modes of competition: (1) facilities-based, (2) unbundled network element (UNE) based, and (3) resale based competition to allow new entrants to reach potential customers.

Facilities based competition involves the placement of a new network in an area where the incumbent local exchange carrier already has one. For example, a new entrant such as XO Communications places a fiber optic network that connects San Francisco's central business district with other business districts regionally and nationally. This approach is the most costly form of competitive entry. This mode of entry is not necessarily pure, since the carrier may also need to lease certain network elements from the incumbent carrier.

UNE based competition involves the use of facilities, such as the access line, from the incumbent local exchange carrier, combined with facilities supplied from the new entrant. For example, Northpoint Communications provides high speed data services using access lines leased from Pacific Bell and its own multiplexing facilities. This method is a less expensive form of entry because it does not require an initial investment in the most costly aspect of the network - from the end-user location to central points in the telephone network. However, the new entrant is highly dependent on the incumbent and must establish ordering, billing, provisioning, and maintenance relationships with them.

Finally, resale competition involves reselling another carrier's service under a different brand. Several established carriers, especially long distance carriers, attempted this form of entry early on, but have since discontinued or scaled back this service. Under resale competition, the service is entirely defined by the incumbent, only the brand and billing change.

Local competition is an experiment and the outcome for the consumer is still undecided. In San Francisco, as well as other parts of the country, competition is more robust for business customers in central business districts than for consumers in residential areas. UNE and resale based competition have not flourished on a large scale. Facilities based competition is necessarily slower to develop due to the cost and time necessary to deploy wholly new networks.

¹¹ According to the FCC, 6% of end-user lines are served by competitive local exchange carriers in California compared to 8% nationally, 20% in New York and 12% in Texas. "Local Telephone

With that in mind, a number of possible outcomes in San Francisco are possible, including:

- (1) Multiple networks will flourish in both residential and business districts;
- (2) Multiple networks will flourish in business districts, but not residential neighborhoods, so residential consumers will be served by two wires, one from the traditional cable and the other from the phone company; or
- (3) One of the incumbent networks, either cable or telephone will prevail and capture most of the market in residential districts and business districts.

It is premature to speculate on the outcome in San Francisco, although all three outcomes are possible.

2. Telecommunications Resources Available to the Public

The networks available to the public vary greatly depending on location in the City. Research conducted for this Plan reveals two very different telecommunications landscapes: residential neighborhoods versus the downtown commercial district. Residential neighborhoods have access to basic services and a limited range of advanced services, are served by fewer providers, and generally have less robust networks. While the central business district has access to the basic and advanced services they need, and is served by multiple providers with more robust networks. Because of these distinct characteristics, each landscape will be discussed separately.

a) Residential Neighborhoods

Our research indicates that San Francisco residents have access to basic voice, multichannel video, and low speed data services. Additionally, most residents also have access to high-speed data services. While San Francisco residents are generally satisfied with the telecommunications services they receive; the services that are available to consumers are constrained by the quality of the networks serving them.

In order to determine the needs of San Francisco residents and small businesses, DTIS conducted a citizen survey, small business focus groups, and a series of public outreach meetings.

- The Residential Phone Survey (RPS) was a statistically valid telephone survey of residents throughout the City, the results are contained in Appendix C in the report titled Results of the 1999 Survey of Residents on Telecommunications Issues.

Competition: Status as of December 31, 2000" Industry Analysis Division, Common Carrier Bureau, Federal Communications Commission, Table 6.

- The small business focus groups were a series of informal discussions on telecommunications topics with an invited, but self-selected, group of small businesses and non-profits. The results of these sessions are contained in Appendix D in the report titled Report on the Small Business Focus Groups.
- DTIS also sought informal input to its plan through a series of public outreach meetings. The public outreach effort is captured in minutes describing these meetings. The public outreach sessions were targeted to telecommunications providers, local businesses, youth, economically challenged and homeless people, seniors, and people with disabilities.

Service Satisfaction

Our research found that San Francisco residential consumers are generally satisfied with the telecommunications services they receive as summarized below.

Table 1: Residential Consumer Service Satisfaction				
Service Type	Overall Satisfaction	Cost	Reliability	Service Response
Wireline Phone	89%	86%	86%	97%
Wireless Phone	86%	86%	65%	99%
Cable Television	75%	74%	95%	95%
Satellite Television	96%	96%	92%	96%
Internet Service Provider	81%	94%	89%	98%
Source: Results of the 1999 Survey on Telecommunications Issues Appendix C				

The strong service quality marks should be taken in context. First, the data is from 1998 and since that time some changes have occurred in the marketplace. For example:

- Providers began to market DSL more widely and aggressively;
- AT&T abandoned its strategy to integrate its long distance, local, wireless, data and cable business and decided to spin these businesses off; and
- RCN entered the market.

In addition, while this information is helpful for comparing one service to another, it is difficult to conclude what is happening to service satisfaction over a period of

time because consumers generally respond favorably to service questions and a comparison at a different time period was not taken.

Finally, anecdotal evidence collected as part of the planning process suggests several potential customer service problems do now exist, including:

- Delays in fulfilling DSL orders and resolving DSL service issues;
- Customer service problems, especially with respect to telephone billing;
- Confusion among small businesses concerning service offerings and pricing;
- Disappointment with slow deployment of advanced services;
- Limited access to reliable and objective information regarding available services and cost;
- Concerns over inconvenience, aesthetic harm and safety concerns caused by installation of facilities; and
- Difficulties reaching underserved groups.

Service Availability

Our research also included findings for residential neighborhoods related to availability of voice, multi-channel video, and data services. These findings are summarized below.

Voice Services

- Voice services are available in all residential neighborhoods.
- A limited number of residential neighborhoods have a choice of landline facilities-based voice providers.
- Mobile voice services are available in most residential neighborhoods with pockets of poor coverage.¹²

Multichannel Video Services

- Multichannel video is available in nearly all residential neighborhoods.

¹² Wireless not a substitute for landline, need cite.

- Sixty-four percent (64%) of residents subscribe to cable service and five percent (5%) to satellite.¹³
- A limited number of multichannel video providers exist:
 - The incumbent, AT&T;
 - A new entrant serving a limited portion of the City, RCN. (See Appendix X for RCN's service area as of August 2001); and
 - Satellite video service for consumers who can place a satellite antennae in the correct orientation.
- Advanced video services are only available in select areas where AT&T has completed its network rebuild and RCN has constructed its network.

Data Services

- San Francisco has the highest percentage of adults with Internet access at work or at home of any United States Metropolitan Area.¹⁵
- San Francisco has the greatest number of high speed Internet access providers of any United States Metropolitan Area.¹⁶
- Low speed data service is available in all neighborhoods and 49% of San Francisco residents subscribe.¹⁷
- High speed data service is available in most neighborhoods with:
 - Digital subscriber line service available in all areas, but availability is limited by distance;

¹³ Results of the 1999 Survey on Telecommunications Issues, p. D-4.

¹⁵ Metropolitan New Economy Index. Progressive Policy Institute, April 2001, p.24. 56.1 percent of adults had Internet access at work or at home compared with 44.6% in the nation's top 50 metropolitan areas and 31% nationwide.

¹⁶ *Ibid*, p. 25. San Francisco has 4.61 high-speed Internet access providers per zip code, compared to an average of 3.12 in the top 50 metropolitan areas.

¹⁷ Results of the 1999 Survey on Telecommunications Issues, p. D-4.

- Cable modem service available in a limited area of the City, namely RCN's Mission District service area and AT&T's Potrero Hill/Mission District rebuild Area; and
- Fixed wireless service available where there is a line of sight to transmitters whether located on land or in satellites.
- High speed data service can be obtained from multiple ISPs over DSL lines, but other technologies are only available through affiliated ISPs including:
 - DSL and satellite service available from a number of Internet Service Providers; and
 - Cable modem and wireless high-speed data services only available through affiliated Internet Service Providers.
- For Fixed Wireless services:
 - Sprint PCS is available to consumers who are able to install a satellite antennae with line of sight to San Bruno Mountain or Mount Tamalpais; and
 - Direct PC is available to consumers who are able to place an antenna that can face the Southern sky, and is now 2-way.
- For mobile data service; low speed is available for:
 - E-mail and specially formatted web content for personal digital assistants and cell phones; and
 - Two-way e-mail messaging service.

Networks & Physical Connections in Residential Neighborhoods

San Francisco's residential neighborhoods are served by a limited number of wireline providers that are associated with a distinct technology.¹⁹ These providers are Pacific Bell using twisted pair copper wire, AT&T using coaxial cable, and RCN using hybrid fiber/coaxial cable.

¹⁹ The discussion of networks and physical connections will be confined to wireline and exclude wireless networks .

The physical layer of each of the older Pacific Bell and AT&T networks is being upgraded by installing fiber optic cable in order to accommodate new services that require the higher bandwidth that fiber optic facilities can carry. In addition to these providers, fixed wireless and mobile wireless providers are serving some residential consumers. While residential neighborhoods house the vast majority of the people and a substantial portion of the businesses in San Francisco, they not yet experienced the benefit of substantially upgraded or new networks.

Pacific Bell provides copper access lines in all residential neighborhoods. These access lines are connected to switches in eleven (11) central offices throughout the City. With this infrastructure, Pacific Bell is able to provide voice service to the entire City over these lines and high-speed data service to the vast majority of homes and neighborhood. Each of these central offices contains digital voice telephone switches for routing telephone calls and a digital subscriber line access multiplexors for aggregating data traffic. SBC, Pacific Bell's parent, is in the process of deploying a high-speed data network, called "Project Pronto," which will bring fiber optic cable deeper into residential neighborhoods. This upgrade will extend the reach and speed of its DSL service to residential and neighborhood business users and allow them to more easily serve large users in outlying neighborhoods with more advanced services that rely on the greater capacity of fiber.

AT&T has a coaxial cable network that reaches nearly all residential neighborhoods.²⁰ The majority of the facilities are capable only of one way transmission of video from the company's distribution point or headend to residences. The network is capable of transmitting a large amount of programming, but does not have routing/switching capabilities that would allow it to provide two way communications. AT&T is in the process of upgrading its network by placing fiber optic cable and electronic components in distribution points known as hubs and nodes to enable two-way communications. This upgrade will allow them to provide high-speed data, voice and interactive video services to consumers; as well as expand its capacity for providing video programming. This upgrade will also entail placing fiber in neighborhoods to connect the new distribution points - hubs and nodes. The signal will be shared among 1,000 households within a node. AT&T projects will pass approximately eleven and four-tenths percent (11.4%) of San Francisco households by the end of 2001.

RCN's hybrid fiber-coaxial network is similar to AT&T's upgraded network but will bring fiber deeper into neighborhoods, supplying approximately 150 households per node. This approach means that fewer households will share the same signal. The network will also be able to provide voice, video and data services

²⁰ Some areas are excluded from AT&T's franchise requirements and the company has chosen not to serve them. These areas generally border Market Street.

through separate networks over the same physical connections. RCN's network is not designed to bring fiber to the home.

b) Central Business District

The central business district includes the City's Financial District and the South of Market Area and represents a very different telecommunications landscape from residential neighborhoods. This landscape is depicted in two reports prepared by Media Connections Group for the City: A Survey of Telecommunications Companies Doing Business in San Francisco (Appendix B) and Report of Interviews of Major Telecommunications Institutional Users in the City and County of San Francisco (Appendix E). The first report dubbed the downtown/South of Market area the "competitive center" because of the large number of telecommunications providers operating in this area.

The area is characterized by a high density of heavy telecommunications users, where heavy telecommunications user is defined as a company or institution with more than \$10,000 per month in telecommunications costs. While these large users draw network deployment, mid-sized users in these areas benefit since they can also take advantage of the availability of these networks.

The downtown/South of Market area differs from the City's residential neighborhoods because large consumers have access to all of the telecommunications services they need and have a choice of several telecommunications providers. Large users in this area do not report any lack of service availability or problems with service.

Service Satisfaction

Large institution users indicated that they are very satisfied with the availability and quality of the services they need as summarized in the table below. The single large institutional user that is not located in the competitive center, University of California San Francisco, has its own dedicated facilities installed. The respondents' assessment of the availability of new services is probably reliable, because these institutions have the resources to assess new technologies as they become available.

**Table 2:
Major Telecommunications Users View of Service**

Service Dimension	Average Score (Scale 1-5)
Reliability: Voice	4.4
Reliability: Data	4.3
Affordability: Voice	3.8
Affordability: Data	3.4
San Francisco Compared to Other Major Markets	3.7
Source: Interviews of Major Telecommunications Users in the City and County of San Francisco Appendix E	

Major institutions also place a great deal of importance on telecommunications and believe that service that telecommunications is an essential infrastructure as summarized in the table below.

**Table 3
Major Telecommunications Users View of Importance of
Telecommunications**

Service Dimension	Average Score (Scale 1-5)
Is telecommunications infrastructure essential?	5.0
How important is the availability of competitive telecommunications service?	4.3
Is availability of telecommunications a determinant of location?	3.5
Should the City participate in the telecommunications industry?	3.6
Source: Interviews of Major Telecommunications Users in the City and County of San Francisco Appendix E	

Service Availability

The large business consumers and providers that were surveyed indicated that there are no constraints on the availability of services in the central business district. In addition to the services identified in the section regarding residential neighborhoods, there are several additional services designed to meet the needs of medium and large sized organizations. One of the distinguishing characteristics of these services is that they are often designed to connect private facilities operated by the organization, such as private voice switches (also known as Private Branch Exchanges or "PBXs") and local area networks to other sites at the metropolitan, regional and national level, and also to public networks, such as the Public Switched Telephone Network (PSTN) and the Internet.

More specifically, the findings related to large business consumers and providers indicate the following.

- With regard to voice services:
 - PBX Trunks provide a connection between an organization's private switch and the public switched telephone network or other private switches;
 - Centrex emulates the features of a private switch by using a provider's central office switch; and
 - VoIP is emerging as a viable option in medium to large businesses.
- With regard to data services, the findings indicate that:
 - Virtual Private Networks are used to connect field workers and remote offices to an organization's data network through the Internet, providing the security features of a private network;
 - Private Line Circuits provide point-to-point connections between an organization's facilities, ranging in speed from a low end of 64 Kilobit per second "Kbps" DS0, moderate speed of 1.5 Megabits per second "Mbps" DS1 copper connections, to high-speed optical circuits of OC 3 155 Mbps to OC 768 at 40 Gigabits per second "Gbps";
 - Optical Transmission provides optical transmission of data over fiber circuits using a variety of technologies including Synchronous Optical Network (SONET), which relies on and Dense Wave Division Multiplexing (DWDM);
 - Dedicated Internet Access provides a dedicated connection to the public Internet at a provider's point of presence; and
 - Network Services that are switching/routing technologies for routing data traffic using several different technologies including frame relay, Asynchronous Transfer Mode (ATM), and more recently Gigabit Ethernet. —

Networks & Physical Connections Serving Business Districts

San Francisco's central business district is served by many competitors. The Provider Survey identified over 12 competitors, including Pacific Bell and a number of newer companies known as competitive local exchange carriers

(CLECs).²¹ This finding is confirmed by the Large Institution survey in which large consumers identified an average of six local carriers that could offer them service.²²

When considering this information, differences between networks should be considered. First, Pacific Bell essentially has two sets of physical connections through which it can reach customers: copper and fiber. Their copper network has been providing data at DS0 and DS1 rates for many years. In addition, Pacific Bell offers higher speed services over a fiber network. New entrants' networks are fiber based and data oriented.

Since the research was performed for the plan, the telecommunications industry has slowed its investment in new infrastructure and upgrading infrastructure of existing infrastructure. This phenomenon is expressed most notably in a massive reduction in the valuation of the telecommunications industry caused by investor skepticism regarding the capacity of the industry to generate revenue.²⁴

Many of the competitors identified in the Provider Survey have gone into bankruptcy, with some simply ceasing operations without any other party acquiring the company's assets. While it is too early to know the ultimate impact of the current telecommunications industry shakeout. It may mean increased concentration on service quality rather than construction; reduced competition on service and price by few players; or simply a temporary reduction in the pace of facility deployment.

c) The Telecommunications Industry

The telecommunications industry has a presence in San Francisco and a role in economic development. The telecommunications industry operates, maintains and provides access to facilities for the transmission of voice, data, text, sound and video between network termination points.²⁵ In addition, to the telecommunications industry itself, there are a number of associated industries in

²¹ A Survey of Telecommunications Companies Doing Business in San Francisco, p. 35.

²² Report of Interviews of Major Telecommunications Institutional Users in the City and County of San Francisco, p. 9.

²⁴ "Downed Lines: Telecom Sector's Bust Reverberates Loudly Across the Economy" Wall Street Journal July 25, 2001.

²⁵ The Telecommunications Industry is represented by North American Industry Code System (NAICS) code number 5133. <http://www.census.gov/epcd/naics/NDEF513.HTM#N5133>

San Francisco with a smaller presence, namely communications equipment manufacturing, cable program distribution, and on-line information services.²⁶

For instance, in 1999, the telecommunications industry in San Francisco:

- Employed 6,211 people;
- Had a payroll of \$520 million annually; and
- Consisted of 184 establishments.²⁷

The telecommunications industry appropriately does not include emerging content oriented industries, such as Internet publishing and broadcasting, wholesale electronic trading and electronic shopping.²⁸

d) Local Authority As Exercised

The City exercises its authority over telecommunications in a variety of different ways. Currently the City is limited in what it can do by pre-emptive federal and state law. This section describes the City's primary roles with respect to telecommunications focusing on areas where authority exist, not on what the City is not doing and why.

Excavation in the Public Right of Way

The City's Excavation Code governs the placement of all facilities on the surface or subsurface of the public right of way, including those installed by telecommunications carriers. (Public Works Code Section 2.4) The City adopted this code in 1997 to reduce the disruption caused by excavation in the right of way by encouraging coordination among excavators and to recover the cost of damage to the City's streets by excavation. The Department of Public Works administers this code and they have also issued orders to implement it. To accomplish the desired outcome, the Code includes the following measures:

- Requires joint excavation among utilities, telecommunications providers, municipal excavators, etc.;

²⁶ These industries are represented by the following NAICS numbers: Communications equipment manufacturing 3342, cable and other program distribution 51322 and on-line information services 514191. Currently, these associated industries are so small that Census Bureau data is not available for confidentiality reasons.

²⁷ 1999 County Business Reports, United States Census Bureau. http://tier2.census.gov/cgi-win/cbp_naics/Detail.exe

²⁸ These emerging industries are being recognized as separate from traditional publishing, wholesale trading and mail order business in the upcoming revisions to the NAICS. <http://www.census.gov/epcd/www/naics.html>.

- Creates a Street Construction Coordination Center;
- Places a five (5) year moratorium on excavation in newly re-paved streets; and
- Imposes a street damage restoration fee to compensate the City for damage caused by excavation.

Telecommunications providers can participate in excavation if they have a franchise from the City or if they are a telephone corporation with authority from the California Public Utilities Commission. Telephone corporations are required to obtain a Utilities Condition Permit (UCP), which serves to verify their authority to install facilities and provide services, and places general conditions on their use of the right of way.

Zoning and Environmental Issues

The City also exercises authority over telecommunications facilities through its zoning regulations. These regulations include Wireless Telecommunications Facilities Siting Guidelines that:

- Are developed in accordance with General plan objectives and policies relevant to community facilities;
- Rank potential sites on the basis of location preference, for example publicly used structures are among the preferred location sites and residential areas among the disfavored sites; and
- Establish an application process, 5-year plan and other processes.

There are no similar guidelines for wired telecommunications facilities. However, the City may have a role in the California Environmental Quality Act (CEQA) review of the installation of new telecommunications facilities. The California Public Utilities Commission has taken the lead role in CEQA review and cities have had an opportunity to take a subordinate role, but the CPUC is in the process of restructuring its environmental review role, which may increase the City's role.

Cable Franchises

Through cable franchises granted under Section 11 of the Administrative Code, the City requires a cable company to abide by specific terms. For example, in the cable franchise recently granted to RCN the City requires:

- The company to build its system and serve customers throughout the City within a specified time frame;

- Compensation for use of the public-right-of-way in the form of franchise fees;
- Customer service obligations;
- Channel capacity and support for public, educational and government access programming; and
- Telecommunications assets for City use, such as conduit, dark fiber and cable service.

Advocacy

The City also participates in the legislative, regulatory and judicial process at the state and federal level to advocate the interests of San Francisco consumers. For example, the City recently participated in the following:

- The CPUC's area code proceeding to advocate for simplified dialing for San Francisco consumers; and
- The Federal Communications Commission's (FCC's) Open Access proceeding supporting consumers' choice among Internet service providers over the cable Internet platform.

City Services

The City offers three telecommunications related services to the public: emergency communications services, electronic government services, and public access points.

Emergency Communications

Emergency Communications consists of receiving and processing emergency 911 calls, public safety—Police, Fire and Emergency Medical--dispatch and coordination on of emergency response. Recently San Francisco has overhauled and upgraded its emergency communications by:

- Creating a consolidated Emergency Communications Department to handle emergency calls from the public and public safety dispatch;
- Building a new, seismically sound facility;
- Implementing a new wireless voice and data system;
- Improving automated call receipt and dispatch functions; and
- Improving record management and scheduling systems.

Electronic Government

Electronic government means the provision of government information and services through electronic means. The City currently provides a wide variety of information electronically including:

- Live video coverage of Board of Supervisors meetings both over the cable television station CityWatch and the CitySpan Web site;
- Agendas and minutes of public meetings, such as the Board of Supervisors and various City commissions and boards;
- Access to the Municipal Code and various departmental orders;
- Access to information ranging from campaign contributions and lobbying activity to statistics concerning public assistance and reports on public health issues; and
- Access to information regarding City services ranging from recreation programs to human services to street cleaning.

The City currently provides a growing number of interactive services over the Internet. Currently, these services include:

- Property tax payment;
- Ordering Birth and Death certificates;
- Business Tax Filing;
- Instant Electrical and Plumbing Permits;
- Library account status; and
- Specialized permits, such as Street Excavation Permits.

The City also provides public access to the Internet at Library's and community centers including:

- The Main Branch of the Public Library has 33 public workstations with Internet access; and

- The neighborhood branch libraries have over 90 public workstations with Internet access.²⁹

3. Telecommunications Resources Available to City Government

City government is a large user of telecommunications goods and services. Even more than most large, complex service enterprises, City government requires highly reliable communications systems to receive public health and safety requests. It needs highly reliable, high capacity, physical data connections to distribute this information. These requirements are in addition to the systems necessary to address more everyday public needs and to administer a large enterprise.

This section describes the voice and data services that the City currently obtains and the underlying networks and physical connections that support these services. One theme emerges from the following description – the City has taken a department-oriented focus for these services. Voice and especially data services have been delivered to address immediate departmental needs and do not reflect a planned, coordinated effort to efficiently meet overall City government-wide needs.

The City differs from other large institutions in that its facilities span the entire City and are not confined to the commercial core. Consequently, City government cannot take advantage of the competitive offering available exclusively in the downtown area or to large institutions in a concentrated area.

The information in this section, especially the qualitative evaluations, are derived from two reports prepared by RCC Consultants for the City: Telecommunications Needs Assessment: Phase 1 and Telecommunications Implementation Plan: Phase 3. The full text of these reports is included in Appendix G to this Plan. Some of the quantitative data has been updated to reflect developments since these reports were prepared.

a) Voice Networks and Services

Findings related to the City's voice services indicate the following.

- The City's voice network consists largely (approximately 82% of access lines) of private switches (Private Branch Exchanges or PBXs) tied together by trunks leased from Pacific Bell.

²⁹ These counts only include terminals with a graphic interface through which graphically based Internet content can be reached. They do not include an additional 150 text only terminals with Internet access.

- The City also employs Centrex—a telephone company central office based alternative to private switches—for some users - approximately 17% of access lines.
- The City's voice network could be improved by adding:
 - Citywide voice mail to facilitate voice messaging and forwarding of voice mail messages;
 - A coordinated dial plan to facilitate dialing among City department users; and
 - Reliance on a common set of features.
- A majority of PBX's are connected to a hub located in Pacific Bell's McCoppin St. Central Office using over 170 T1 lines, occasionally the connections are routed through other PBXs and Central Offices.
- PBXs are grouped in order to facilitate calling among groups that tend to call one another frequently (a.k.a., communities of interest).
- The technical manner in which these groupings are accomplished determines the ability to use abbreviated dialing and common features outside of the group.

b) Data Services and Networks

Findings related to the City's data services include the following.

- Growth in existing applications and the implementation of planned applications and systems will place significant additional demands on the City's data communications networks, such that the current infrastructure will be insufficient.
- The City's data networks do not reflect coordinated planning or adherence to a set of standards and this condition has led to performance problems, higher network management costs, insufficient capacity in some areas, and duplicate resources;.
- The City spends approximately \$2 million per year for Pacific Bell data network services, such as T1 lines, frame relay and asynchronous transfer mode (ATM).
- Due to the decentralized nature of the City's various networks, no data exists regarding the overall availability and performance of City networks.

- The City has a "Citywide" data network managed by DTIS that covers many departments as well as several independent data networks operated by large departments.
- The Citywide data network operated by DTIS Serves 60 City departments and agencies and includes a backbone network with two components:
 - An Internet Protocol (IP) based Citywide wide area network (WAN) connecting facility specific local area networks (LANs) and other equipment consisting of data lines leased from Pacific Bell ranging from Digital Signal Level (DS) 3 (44.7 Mbps) to multiple DS 1 (1.5 Mbps) and DS0 (56 Kbps) lines with high and mid capacity Cisco routers; and
 - A legacy IBM Systems Network Architecture (SNA) legacy network using SNA specific controllers and workstations connected by low speed data lines leased from Pacific Bell.
- The City obtains dedicated Internet access from Pacific Bell.
- Many of the City's large departments also operate independent data networks, these include:
 - MUNI's frame relay based network serving 14 locations;
 - Public Health's Data Network, which uses ATM at its core and T1 and Frame Relay to reach smaller sites; and
 - Parking and Traffic's Data Network, which uses frame relay and T1 lines.

B. Policy Issues and Concerns

The research conducted for this report is intended to identify telecommunications policy issues for the public and the City. Examining both supply and demand reveals that consumers are generally satisfied with the services they are receiving and a variety of providers are investing in new networks and facilities to provide these services.

In addition to those positive findings, several concerns do emerge and are outlined below. Again, these concerns are categorized by external (residents and business consumers) and internal (City government operations). The external issues are really community and economic development issues since telecommunications is an essential component of the community's infrastructure and a strong telecommunications industry is key to deploying this infrastructure.

The concerns that follow are the foundation for the development of the goals, initiatives, and policy recommendations included in the Plan.

1. External: Community and Economic Development

The principal external issues revealed by our research include:

- The deployment of robust new or upgraded networks in residential networks is only beginning, covering a limited geographic area;
- Choice of service providers is limited in residential neighborhoods;
- Providers are having difficulty quickly and efficiently fulfilling orders for new services, particularly high speed Internet access;
- Customer service, especially with respect to telephone billing, is often poor;
- It is sometimes difficult for small companies to compare services and prices;
- There are regions within the City where certain services, such as payphones and mobile phone, are not readily available; and
- Installation of telecommunications facilities is causing disruption and visual blight.

To address these issues and promote community and economic development, the City should pursue the following goals.

- Consumers—individuals, businesses and community-based organizations (CBO's) -- have a choice of advanced, affordable telecommunications services to promote individual, community and economic development.
- Consumers receive sufficient information to make choices about telecommunications services and receive high quality, responsive customer service.
- The public benefits from state of the art emergency communications services, i.e., E911, by being able to reach these services easily via a wide variety of sources.
- Residents, businesses and other government entities are able to use technologies, including the Internet, to access City services, transactions, and information and participate in democratic processes.
- Installation of telecommunications facilities occurs with the least possible harm to neighborhood aesthetics, public safety, and traffic flow.

2. Internal to City Operations

The principal internal issues concerning the City revealed by the examination of San Francisco today are:

- A lack of coordination and planning has led to inefficient use of telecommunications resources; and
- Additional capacity will be necessary to meet increased demand due to the expansion of existing service/applications and the introduction of new ones.

To address these internal City government issues, the City should pursue the following goals.

- Centralize management of telecommunications resources and services.
- Establish of a converged enterprise network to support the City's internal operations.
- Enterprise management of telecommunications assets obtained through negotiated agreements.
- Develop an efficient sourcing strategy for obtaining telecommunications products and services.

VIII. A Look Into the Future

Flying cars, space colonies, robotic servants, networked appliances that respond to voice commands – the future, as imagined by the media and even technology companies, remains intriguing but somewhat elusive. While many technological advances have been made and “networking” or tying everything together is the norm, we are not yet living like the Jetsons in a space age community. So what will the future hold?

This section of the City’s Plan takes a look at San Francisco’s future based on current trends and the assumption that all or a substantial number of the goals, strategic initiatives and policy recommendations of this Plan are adopted and implemented. While we are only looking ahead three to five years, we endeavor to describe the impact of current trends and this Plan on the San Francisco’s community and government operations.

A. The Telecommunications Landscape

The future of the telecommunications landscape is driven by “the network” and includes continued growth in demand for high-speed access, difficulty in deploying high-speed infrastructure, network convergence, transformation and convergence of end-user devices, and evolution of content and applications. Since networking will continue to be important into the foreseeable future, San Francisco must remain one of the most wired cities in the US in order to enjoy the benefits of a connected community and remain a viable place for information-dependent businesses. These factors are all applicable to San Francisco and our future telecommunications landscape.

The economic downturn that began in 2000 has hit telecommunications the hardest of any industry, slowing the deployment of high-speed or broadband telecommunications networks across the country and, unfortunately, San Francisco has not been spared. This slowdown proves what many people suspected, building or even rebuilding a robust, high-speed network is costly, time consuming and may not provide the payback necessary to justify the expenditure. Despite this slowdown, the number of individuals using broadband connections continues to grow at a rapid rate. For instance, the number of broadband users grew by nearly 134% in twelve months, from April 2000 to April 2001, according to Nielsen/Net Ratings. Few predict that the demand for broadband will level off or decrease significantly in the near future. How does that impact an urban community like San Francisco, which already represents nearly six percent of all American high-speed Internet users? Consumers demand connectivity, providers are experiencing difficulty in delivering it quickly – where does government fit in and how is it impacted?

The network is important but only one part of the total equation – what about end-user devices – computers, telephones, and wireless devices? Current

thought is that these devices will continue to evolve both independently, and more importantly in a converged manner. While many attempts have been made in the past to merge phones, computers, and PDA's into a single device, recent developments are promising. Additionally, the merger of the telephone with the desktop computer and the development of a single device that is both your office or home telephone and a mobile phone continue to be explored. The evolution of end-user devices will forever alter how people communicate over the network and drive how content is provided.

While we are already experiencing the convergence of networks and the end-user devices that access it, the information transmitted over the network will experience significant change in the next few years. The demand for and use of graphics, video, and interactive applications drives the need for secure, robust, and reliable networks – terms that are associated with private, closed networks but are seldom used to describe the Internet.

These and other questions and considerations are examined below in light of the impact to individual and business consumers, future consumers, the community, economic development, and San Francisco's local government operations. Finally, this section of the Plan concludes with a few words of cautious and a discussion of the challenges that face implementation of the Plan's recommendations.²

B. Individual Consumers

One thing is certain, individual consumers will continue to have choices for spending their telecommunications dollar. It is probable that these consumers will continue to consider telephone and multi-channel video service first. Choices after that will depend largely upon individual needs and the availability and cost of other advanced telecommunications services. Within the past 10 years, new services such as wireless telephone and Internet access have emerged to become common household expenditures, while expenditures for other services, such as long distance are declining and expected to vanish.

Broadband Internet access will continue to grow. Availability, cost, and development of popular applications that use high-capacity bandwidth will determine the ultimate demand for broadband Internet access. In the immediate future, new services such as interactive TV, video on demand, and wireless data will take hold as long as bandwidth is available to support it. In the longer term, telecommunications service will be embedded in other household items, such as appliances, so that the distinction will be blurred.

Finally, there is the question of whether the underlying physical network will be in place. Until recently, the industry was enthusiastically deploying new facilities and upgrading existing facilities. Even with a slowdown in deployment, or perhaps because of it, the industry will continue to find ways to pump more information through existing facilities, like the predominantly twisted copper

telephone plant, the predominantly coaxial cable plant, or possibly electrical wires. The question will be whether individual consumers demand for new high bandwidth services can be satisfied with upgraded versions of these legacy networks or will require wholly new fiber to the home networks need to be installed. The decision will ultimately be determined by simple economics. Will consumers be willing to spend a sufficient amount on telecommunications services to justify the expense of deployment? Can the industry develop a successful pricing model for new services?

C. Business Consumers

Businesses need for increased capacity will continue. As the economy becomes more reliant on information, businesses will require more capacity for transmitting information. Networks in the downtown area and regional and national networks may have sufficient capacity to meet these growing needs for many years to come. In addition, the industry will continue to find ways to pump more information through existing facilities, such as dense wave division multiplexing. This capacity is good news for business consumers in the downtown area. The current slowdown in the growth of the telecommunications industry is an opportunity to determine where there is sufficient capacity and where additional capacity may be needed. Once the remaining shortages are identified, small and mid-sized businesses in outlying neighborhoods may be able to take advantage of increases in capacity much like large, downtown businesses. The new telecommunications landscape will allow providers to focus on efficiency and customer service rather than network growth.

Field devices, such as PDA's, that are more convenient and less expensive than previous alternatives will allow field workers to exchange data with offices. These devices will permeate more deeply into business operations, increasing the demand for wireless telecommunications.

D. The Next Generation of Consumers

The next generation of consumers will also shape the future of telecommunications. A preceding generation's familiarity with the telephone handset and the television remote control may give way to a generation just as comfortable with the computer keyboard and the game console joystick. These more intuitive, easy-to-use devices will help integrate telecommunications into daily life. Additionally, the next generation of consumers will grow up "connected" and their demands will drive the need for advanced telecommunications in all areas of the City.

E. The Community

Telecommunications will be part of a new technology that will redefine community to one that is based not only on geography, but also based increasingly on interest. Traditional demographic distinctions may disappear

when technology is the platform as categorizations based on physical attributes like age, race, and perceived attractiveness give way to new self-defined senses of identity. Diversity may be both encouraged by new opportunities for expression and communication and discouraged by anonymity.

The government's role in bringing people together by providing a common set of public services will continue and be enhanced. Transactions between people as well as with government and business can be accomplished remotely and with less friction. Simple transactions may be streamlined and transactions that require more attention and intervention will be supported by ready access to information. This ready access to information from anywhere at any time will also allow proactive services that anticipate needs while respecting privacy.

New wired neighborhoods can recreate sense of local community. New developments, such as Celebration, Florida and DC Ranch, Arizona are current examples of a future where local community based Intranets are used to bolster a sense of neighborhood. This future allows the individual to be a citizen of a neighborhood, city, region, state, nation and world at the same time.

To take advantage of this future, individuals, including people with disabilities, must have access to an easy-to-use, ergonomically healthy, non-intimidating interface. They must also understand the relevance, benefits and uses of the technologies that ride over the telecommunications infrastructure. Most importantly, all consumers will either be able to afford the advanced services necessary to participate in the community or will have access to facilities in public places.

Finally, this future requires a knowledgeable individual that is an informed, educated and demanding consumer that can express his/her needs and ensure that they are met. This implies sufficient choice among service providers to drive the industry toward customer preferences.

F. Economic Development

Telecommunications will be critical in spurring economic development in this future. It is embraced to the extent that it results in increased profitability, by reducing costs after an initial investment. It also allows businesses to expand into new markets by adding a virtual presence. As a vital infrastructure, telecommunications plays a pivotal role in attracting and retaining businesses. It creates a new market with increased opportunities for local minority and women owned business enterprises, especially with the City. As the telecommunications future spreads to all neighborhoods through universal access, businesses have new markets and barriers are broken down. Businesses large and small will benefit from these changes, as well as non-profit enterprises.

The future also makes possible increased flexibility and productivity in the work place. By creating an opportunity for a virtual workplace that depends on

reliable, affordable and accessible telecommunications. This future promotes flexible schedules and may require increased focus on the ability to get in synch with business associates.

G. City Government (Internal)

Telecommunications will enable the City to create new distribution channels for its services. While only a small group may take advantage of new channels at the outset, services distributed using the telecommunications infrastructure will increase over the long run. Telecommunications based services will increase efficiency by making it easier for residents to do business with the City and causing the City to improve its underlying systems to support new distribution channels. By making transactions with the City easier, compliance with licensing, registration, permitting and payments will increase. Real time collections will lead to new revenues.

Reliance on technologies that use telecommunications will change the culture of government. A more resident/customer focus will make City government a more attractive place to work, as well as improve service delivery to customers. A new workforce will be able to rely on systems that allow them to serve residents better. The result will be a City government that has customer responsiveness and efficiency typically associated with business. Like a business, in order for customers to make use of these advances, the City will have to market its services.

Increased access through the use of telecommunications will also allow more citizens to be more involved in and knowledgeable of City processes. Citizens will be able to take advantage of enhanced due process.

Over time, even the impacts of deployment on aesthetics and mobility will be diminished as deployment will be on a slower pace designed to make incremental improvements and repair rather than major overhauls and new networks.

H. A Word of Caution

The future of telecommunication dependent technology also has dangers, and in preparing for the future we must be aware of and cautious of these dangers. By being better connected, people may have constant burdens placed on their time and work may be allowed to intrude on the quality of non-work life. Telecommunications may increase isolation or disconnection within local communities as members of the community are pulled toward non-local interests. Finally, the total bill for telecommunications related technologies might increase as more technologies are needed or required to support customers' increasing demands.

The future may not materialize if people are not prepared through education and training to use the technologies. Similarly, if the technologies are not integrated and do not work well together, then their promise may not be realized.

With regard to local government services, new telecommunications technologies that facilitate transactions with the public may cause these institutions to be overwhelmed by increased volumes of contact. Finally, local government may not fully realize efficiencies if parallel systems are maintained to support multiple service delivery channels.

I. Challenges of Achieving the Future

San Francisco's future will rely heavily on knowledge. As business, government and daily life become more dependent on knowledge, and the capacity to transmit information becomes more critical. Telecommunications represents the underlying means for conveying knowledge. The goals, initiatives and policies set forth earlier in this Plan are designed to allow the future envisioned here to unfold.

The *San Francisco Today* section of the Plan describes the context in which these goals, initiatives and policies are designed to act. With respect to the public, that section describes rapid deployment of new telecommunications networks in the downtown area, which is starting to expand to residential neighborhoods in the form of new and rebuilt networks. With respect to City government, that section describes a decentralized management structure without the necessary tools to bring a converged network for meeting City needs.

This Plan establishes a set of goals for the City's telecommunications services and infrastructure designed to make the beneficial aspects of the future possible and mitigate some of the risks. These goals will address the needs of the public—both residents and businesses—and City government.

The overarching outcome is that residents, businesses and City government have the telecommunications resources that they need to prosper. Achieving this outcome will face differing challenges for the public and for City government. For the public, it means harnessing an emerging, still uncertain competitive industry to deliver services. For City government, it means addressing management and infrastructure issues directly.

IX. Conclusion

The goals, initiatives and policy recommendations contained in this Plan will have great benefits for the public in terms of economic and community development and more efficient City government. These benefits have been described at length earlier in the Plan. It is also important to realize that there will be definite costs if the City does not adopt this Plan and mobilize to implement the initiatives contained herein. Furthermore, it is important to realize that this Plan is just a first step. Once it is adopted, the City must begin implementing the proposed initiatives and ensure that the Plan remains a relevant blueprint by beginning a process of reviewing and updating the Plan.

A. Consequences of Not Implementing Initiatives and Policies

The consequences of failing to implement the initiatives and policies recommended in this Plan include suppressed community and economic development and less efficient and effective City government.

Advanced telecommunications infrastructure and services are critically important to San Francisco's community and economic development. As the economy, culture and education become more information-based, telecommunications—the capacity to deliver information—becomes vitally important. If San Francisco does not implement policies that facilitate and encourage the deployment of new networks capable of delivering new services, then the City's residents and business will not be able to benefit from technological advances.

While new telecommunications networks and services are important to the continued vitality of the City, other important values, such as consumer protection, universal service and aesthetic concerns, should not be sacrificed. The value of new networks to the community and economy are diminished if all residents do not have an opportunity to obtain these services; if consumers are not protected from abusive sales and marketing practices; if facilities are not deployed in a way that minimizes harm to mobility and aesthetic values; or if they receive un-warranted and un-targeted subsidies.

Implementation of the internal initiatives related to the City government's management and use of telecommunications are essential for providing efficient and effective services to the public. If the City fails to implement the telecommunications initiatives described in this report, it will continue to suffer dispersed management of telecommunications resources and services; no coordinated network planning for use for internal operations; no assurance that telecommunications assets are used to their maximum benefit; and no assurance that telecommunications products and services are obtained from the most efficient source. While this scenario is reminiscent of the status quo, the result will be worse than maintaining the status quo since the City will have wasted an opportunity to create a more efficient structure for managing its

telecommunications resources and identifying a network solution that best meets its collective needs.

B. Implementation Strategy

Implementation of the plan will require the appropriate identified City agency to carry out the recommended initiative and for the City's enterprise IT department to measure the achievement of identified goals.

Implementation of the initiatives in this Plan may require further strategic planning and certainly each initiative discussed in this Plan will be the subject of a specific implementation plan. These implementation plans should include:

- A detailed lists of tasks, deliverables, and milestones;
- A time line;
- Resource requirements;
- A proposed budget; and
- Benefit/cost analysis.

In many cases, the initiatives included in this Plan are already underway. In these cases, the planning process conducted for the project will be reported to the Commission. For initiatives carried out by City agencies, The Commission will notify the department of adoption of the recommendation and offer appropriate assistance.

Implementation will also require monitoring of the measures associated with each goal. These measures are designed to see if each goal is being achieved. As each initiative is implemented, the appropriate City agency may also seek to measure the impact of specific initiatives in achieving its goal. Measurements will help determine if the initiative is responsible for causing achievement of the goal. In addition, in some cases the measures will require refinement, so that specific indices, sources and benchmarks are identified.

C. Plan Review and Update Process

A review and update process is a key element of the Plan. This process is the on-going mechanism that sustains the Plan and reacts to new developments. The Plan Review and Update Process will have four major components as follows.

1. Monitor the availability of telecommunications services to the public—both residents and businesses, to:

- a. Determine whether new services are being deployed in a timely, fair, affordable and safe manner; and
 - b. Assess the needs of residents and businesses.
2. Monitor the management and deployment of telecommunications products and services for internal City government use.
3. Evaluate the effectiveness of initiatives and achievement of goals.
4. Propose modifications to Plan based on new developments and findings.

The Administrative Code requires that the Telecommunications Commission update the plan every 24 months.³⁰ Upon adoption of the initial plan, the Commission will begin planning for the first review cycle.

³⁰ Administrative Code, Sec. 11.88(f)

